Message

From: Strynar, Mark [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=5A9910D5B38E471497BD875FD329A20A-STRYNAR, MARK]
Sent: 5/2/2018 11:27:16 AM
To: Ken Otterbourg Ex. 6 Personal Privacy (PP)
CC: Lindstrom, Andrew [Lindstrom.Andrew@epa.gov]
Subject: RE: Fw: Media inquiry from Fortune magazine re: GenX

Thanks Ken. I addition I wanted to check the version sent. This is what I agreed to after some editing.

Mark

From: Ken Otterbourg [mail Ex. 6 Personal Privacy (PP)
Sent: Tuesday, May 01, 2018 4:27 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: Fwd: Fw: Media inquiry from Fortune magazine re: GenX

here's what you sent... I see the problem... You weren't copied on this email...

---------- Forwarded message ----------
From: **Maguire, Megan** <Maguire.Megan@epa.gov>
Date: Mon, Apr 23, 2018 at 10:56 AM
Subject: Fw: Media inquiry from Fortune magazine re: GenX
To: " Ex. 6 Personal Privacy (PP)
Cc: "Jones, Enesta" <Jones.Enesta@epa.gov>, "Hubbard, Carolyn" <Hubbard.Carolyn@epa.gov>

Hi Ken- below are responses from Mark Strynar to your original questions. I've copied Enesta Jones who will be your point of contact for the second set of questions you sent last week. Thanks for your interest in our research!

-Megan

1) **Walk me through the science of finding minute amounts of chemicals in the water. How is technology changing this process. What does it mean that we can pinpoint smaller and smaller amounts of chemicals at the PPT level?**

Classically the work that has been done in environmental monitoring (water, air, soil etc..) has been called targeted analysis. What this means is analysis of a select set of known chemicals in a sample with well-tested methods using commercially available analytical standards for accurate quantitation. For example, how much PFOA/PFOS is in my water sample? We have been doing this in my lab for perfluorinated chemicals (PFAS) since 2004 or so. The process of collection, concentration and analysis is very time consuming and labor intensive. In the end you essentially only get analytical results for those known chemicals. The advent of high resolution mass spectrometry (HRMS) has allowed us to ask new questions such as what additional unknown chemicals are in my sample. These HRMS instruments are more sensitive and allow researchers to discover chemicals in samples that were previously unknown using a qualitative technique known as non-targeted screening. Using the same collection and concentration steps we can now use HRMS to discover new chemicals and predict chemical formulas for chemicals in a sample with a high degree of certainty, without the need for targeted methods. The Parts per trillion (ppt) level (ng/L) is essentially where most analytical labs are measuring most environmental contaminants in water samples. These concentrations closely align with the EPA PFOS/PFOA Health Advisory of 70 ng/L.

Was the Cape Fear chosen for your original research mainly out of proximity?

In our original work (Nakayama et al., 2007) proximity was the main reason for studying the Cape Fear river. In our follow-up work (Strynar et al., 2015; Sun et al., 2016) it was both based on our findings from our original work and the ability to get contemporary samples from source water local drinking water treatment plant operators who were collaborators.

2) How did all this come into play with the discovery of GenX in the Cape Fear First, is the forensics/process of finding chemicals -- particularly novel chemicals -- in the water. How has it changed. What does that mean.

The discovery of GenX (or HFPO-DA) and at least 11 other associated per- and polyfluorinated chemicals is chronicled in Strynar et al., 2015. In this work it was certainly a forensic investigation to begin to understand the impact of industrial discharges to the Cape Fear River. This process involved sequential sampling of the Cape Fear River at locations some distance from each other, and comparing what new chemical peaks occurred downstream relative to an industrial discharge source upstream. For the chemicals isolated as being new in a downstream sample relative to an upstream sample we used HRMS to figure out a chemical formula and proposed chemical structure. At the time we were only able to obtain one chemical standard we could purchase for confirmation (HFPO-DA), however related chemicals structures were proposed. This relied upon the fact the per- and polyfluorinated chemicals when produced result in a homologous series of chemicals differing in carbon chain length (here CF2 groups) with the remainder of the chemical being identical. Some of this discovery was also based on the Toxic Substances Control Act (TSCA) inventory of a nearby fluorochemical manufacturing facility which lists on-hand chemicals.

3) I think I read somewhere that it can be difficult to identify what gets found in the water. Why is that so? and how does it get resolved. Was that the case with GenX.

It is very difficult to identify what is found in water if it is truly an unknown chemical. This is because the HRMS instrument does not tell you if it is a naturally occurring chemical (humic material, proteins, natural products) or manmade chemical (pharmaceutical, polyfluorinated chemicals, pesticides) in a sample. Any and all chemicals that will be extracted and ionized in the mass spectrometer are visible. Discovering what is important within that mix takes a lot of time and effort. This gets resolved by a group of dedicated analytical and environmental chemists working to figure out what requires further attention. This was the case with GenX (HFPO-DA) and 11 related PFAS. Interestingly what makes PFAS standout from other manmade and natural chemicals is a property called negative mass defect. This is due to the fact that PFAS contain many fluorine atoms which gives them this characteristic. Natural products and humic material generally have a positive mass defect. This characteristic helps us to isolate chemicals requiring further investigations. This is complicated by the fact that other atoms (phosphorus, sulfur, oxygen, chlorine, bromine) also lead to a negative mass defect.

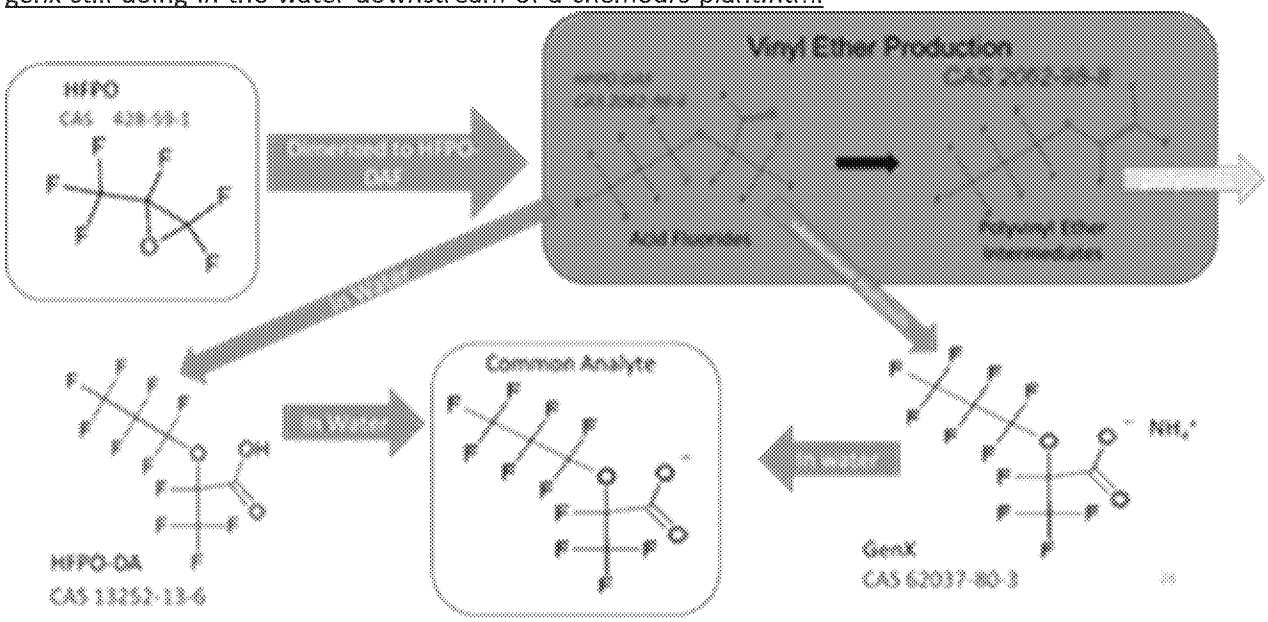
4) Why are these chemicals referred to as GenX, as opposed to HFPO-Dimer Acid. My understanding is that GenX covers a wide range of chemicals?

I would refer you to DuPont's brochure for GenX for some of these answers. https://bladenonline.com/wp-content/uploads/2017/06/Chemours_GenX_Brochure_Final_07July2010.pdf

This is a very confusing topic and may require some illustration. GenX is a processing aid technology used to make fluoropolymers. The ammonium salt of HFPO-DA is named in the brochure as the polymer processing aid (PPA) needed to make fluoropolymers in water based settings. It is essentially a surfactant that helps the building blocks of fluoropolymers come together in water for synthesis. It is much like dish soap as a surfactant helps oil/grease and water come together in your kitchen sink. HFPO-DA could be made as a sodium salt, potassium salt or another salt but that is detrimental after a polymer is made. The reason is ammonia (NH_4^+) can be driven off a polymer with heating whereas sodium (Na^+), and potassium (K^+) cannot leading to undesirable residual in the manufactured fluoropolymer.

To answer what is GenX versus HFPO-DA I would say the mass spectrometer measures ionized chemicals which cannot distinguish from HFPO-DA and the ammonium salt of HFPO-DA in water because they both become common chemical. The term GenX was picked up on I think since it was easy to say and remember.

For further information please refer to Cheryl Hogues article in C&E News https://cen.acs.org/articles/96/i7/whats-genx-still-doing-in-the-water-downstream-of-a-chemours-plant.html



5) What do we know about GenX from a toxicology standpoint?

Here are four papers published in the peer-reviewed literature on this chemical.
Rae et al., 2015 Toxicology Reports page 939-949
Hoke et al., 2016 Chemosphere page 336-342
Gannon et al., 2016 Toxicology pages 1-9
Rushing et al., 2016 Toxicological Sciences pages 1-11

In addition there is an assessment from the Netherlands called "Evaluation of substances used in the GenX technology by Chemours, Dordrecht" summarizing additional info that is known. https://www.rivm.nl/Documenten_en_publicaties/Wetenschappelijk/Rapporten/2016/december/Evaluation_of_substances_used_in_the_GenX_technology_by_Chemours_Dordrecht

6) How do we keep up in a world where new chemicals are being created at a rapid pace? is there a better way to test and assess the safety of chemicals in a fast-changing world.

This is a difficult question to answer. One of the better ways to test and assess chemicals would be to evaluate the environmental occurrence of chemicals. Non-targeted HRMS analysis provides a much larger window to view environmental chemical contaminants providing accurate identification, though only qualitative (i.e., semi-quantiative) measurement. This technology can be coupled with high throughput toxicology screening (HTTS) to get a rapid answer and then be followed up with more intensive study if deemed necessary. Our technology to detect and screen however is not yet mainstream to "keep up" as you put it.

7) What are the next steps in your research in this area?

There are ongoing projects for discovery of other novel chemicals (PFAS and others) in the Cape Fear river as well as other media and at other locations within North Carolina and the United States. Novel compound discovery and methods development is never static, and requires ongoing investigations to remain current.

Megan Maguire
Office of Research and Development, US EPA

From: Ken Otterbourg <Ex. 6 Personal Privacy (PP)>
Sent: Monday, April 16, 2018 4:49 PM
To: Maguire, Megan; Hubbard, Carolyn; Linkins, Samantha
Subject: Re: Media inquiry from Fortune magazine re: GenX

Megan, et al.

Hi. Here are the questions I would like answered by EPA. My deadline is 4/27. A week from Friday. That seems sufficient. I've attached several documents from EPA's website as reference information for some of the questions.

My basic aim here is to understand EPA's response to the GenX controversy to date.

1. Just to confirm. Currently, there is no standard for release of GenX chemicals in the air or water?

2. The below two items in BOLD are mentioned in the EPA Fact sheet (see attached):

EPA has initiated an investigation into Chemours' compliance with a 2009 order issued under the Toxic Substances Control Act for the production of GenX to determine if the company is in compliance with the order to control releases at the Fayetteville facility.

Has this investigation been completed? If not, where is the process at this point? And why is it taking so long?

Separately, the fact sheet mentions this:

EPA has received the data from Chemours and is using it to update its risk assessment.

Can you explain what this means?

To that point. Help me understand risk assessment in the context of GenX. What do we know and what don't we know. Is this class of chemicals somehowmore problematic? How does EPA help cut through the fear and uncertainty in the public's mind? What is the challenge of modeling long-term, low dose exposure to emerging contaminants? Are there ways to speed up that process?

3) This is mentioned on this page: https://www.epa.gov/pfas/epa-actions-address-pfas (also attached)

- Developing human health toxicity values for GenX and PFBS **(July 2018)**

Is that deadline on track? In laymen's terms, what does it mean to develop human health toxicity values. How is that different from regulatory standards?

Related to this, is EPA conducting its own toxicity assessments? Or is it relying solely on existing research?

4) Do these chemicals need to be regulated? Does EPA consider them unregulated at the present? Why or why not?

5) The Lautenberg amendments to TSCA were passed in a rare bipartisan moment. Is that spirit of cooperation/consensus still present as stakeholders work through the rulemaking/implementation process?

Is there anything else I need to know?

Thank you.

Ken

Megan Maguire

US EPA, Office of Research and Development

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